N° 420 A.D. 1896

Date of Application, 7th Jan., 1896

Complete Specification Left, 3rd Sept., 1896—Accepted, 17th Oct., 1896

PROVISIONAL SPECIFICATION.

Improvements in Dental Hand Pieces.

I, JOHANNES THEODOR PEDERSEN, residing at the corner of Second Street and Woodside Avenue, Woodside in the County of Queens and State of New York, United States of America, Manufacturer, do hereby declare the nature of this invention to be as follows :—

In dental hand pieces as heretofore constructed, the operating tool has been held in the hand piece by a chuck, and the engagement or liberation of the tool in the chuck has been effected by mechanical devices that complicated the hand piece and made the same expensive and required the use of both hands to release the operating tool.

The object of my invention is to simplify the construction and lessen the cost of the hand piece. The tool employed therein is firmly held by the clamping mechanism in its normal position and released by a direct lateral pressure upon the hand piece, while being held in one hand.

In carrying out my invention I employ a flexible case, a tool-holder for holding the operating tool, and internal mechanism for rotating the tool holder and tool. While the flexible case and internal mechanism are axially in line, the tool-holder firmly grips the tool, but when the axial line is disturbed by bending or altering the alignment of one part of the case to the other, an elongation is produced which releases the grip of the toolholder upon the tool. This grip is restored the moment the pressure upon the flexible hand piece is released and the parts return to a normal condition of alignment.

The hand piece case is made with the forward or pointed end rigid, and the other part screwing therein, is provided with a helical spring secured to end collars, and the same maintains the parts in alignment while the tool is in use. One end collar connects with the forward and rigid end of the case and the other collar connects with the covering of the flexible or motor shaft.

I prefer to employ a tubular case screwing at one end onto this latter collar and covering the spring and bearing at its opposite end face against the collar connected to the forward rigid end. This case may also be made with one part rigid, and the other part provided with a pivotal or hinge joint.

The internal mechanism of the hand piece comprises a stem or shaft from the dental engine, a coupling and the rotating sleeves, a spring tool-holder for gripping the tool, an adjusting screw stem, a spring, a rod having a head bearing by the action of the spring against a curved surface and curved rocking surfaces to the parts that permit a deflection of the mechanism from a straight line when the flexible case is bent in the hand, so as to effect the release of the operating tool from the grip of the chuck.

Dated this 7th of January 1896.

BREWER & SON,
London and Leeds, Agents for the Applicant.

[*Price* 8*d.*]

COMPLETE SPECIFICATION.

Improvements in Dental Hand Pieces.

I, JOHANNES THEODOR PEDERSEN, residing at the corner of Second Street and Woodside Avenue, Woodside, in the County of Queens and State of New York, United States of America, Manufacturer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement and accompanying drawings, that is to say :—

In dental hand pieces as heretofore constructed, the operating tool has been held in the hand piece by a chuck, and the engagement or liberation of the tool in the chuck has been effected by mechanical devices that complicated the hand piece and made the same expensive and required the use of both hands to release the operating tool.

The object of my invention is to simplify the construction and lessen the cost of the hand piece. The tool employed therein is firmly held by the clamping mechanism in its normal position and released by a direct lateral pressure upon the hand piece while being held in one hand.

In carrying out my invention I employ a flexible case a tool holder for holding the operating tool, and internal mechanism for rotating the tool holder and tool. While the flexible case and internal mechanism are axially in line, the tool-holder firmly grips the tool, but when the axial line is disturbed by bending or altering the alignment of one part of the case to the other, an elongation is produced which releases the grip of the tool-holder upon the tool. This grip is restored the moment the pressure upon the flexible hand piece is released and the parts return to a normal condition of alignment.

The hand piece case is made with the forward or pointed end rigid, and the other part screwing therein, is provided with a helical spring secured to end collars and the same maintains the parts in alignment while the tool is in use. One end collar connects with the forward and rigid end of the case and the other collar connects with the covering of the flexible or motor shaft.

I prefer to employ a tubular case screwing at one end onto this latter collar and covering the spring and bearing at its opposite end face against the collar connected to the forward rigid end. This case may also be made with one part rigid and the other part provided with a pivotal or hinge joint.

The internal mechanism of the hand piece comprises a stem or shaft from the dental engine, a coupling and the rotating sleeves, a spring tool-holder for gripping the tool, an adjusting screw stem, a spring, a rod having a head bearing by the action of the spring against a curved surface and curved rocking surfaces to the parts that permit a deflection of the mechanism from a straight line when the flexible case is bent in the hand, so as to effect the release of the operating tool from the grip of the chuck.

In the drawing,

Figure 1 is a longitudinal section of my improved dental hand piece.

Figs. 2 to 9 inclusive represent elevations of the parts of the internal mechanism.

Fig. 10 is an elevation of a modification of my flexible case, and Fig. 11 is a cross section at *x*, *x*, of Fig. 10, and Fig. 12 is an elevation of a modification of my flexible case.

Fig. 13 is a longitudinal section representing my improved hand piece in a simpler form, and Fig. 14 is an elevation of the same.

Figs. 15 to 27 inclusive represent elevations of the parts of the internal mechanism, and Fig. 28 is a longitudinal section representing the elongation produced by deflecting the parts from a straight line.

The figures show the parts of about twice the usual size.

Similar letters of reference on the sheets of drawing represent corresponding parts.

The case of my dental hand piece is preferably composed of the rigid taper case A whose exterior is preferably roughened or ribbed to provide a firm hold for the hand, and the case B composed of the helical spring *a*, the collar a^1 and collar a^2. These collars usually have knurled surfaces and in Fig. 1, there are cylindrical portions thereof that extend into the ends of the spring and to which the spring is soldered to form firm connections. The collar a^1 is united by a screw coupling at 2 to the taper case A and the end of the collar a^2 is threaded for connection with the sleeve that receives the end of the flexible covering for the shaft of the dental engine.

In Fig. 13 the collar a^1 receives within it one end of the helical spring *a* and the collar a^2 is threaded for a longer distance and the tubular case *l* screws thereon and surrounds the spring *a* and extends into the enlarged end of the collar a^1 and the end bears against said collar and the case *l* can be turned to strain the helical spring *a* to apply any desired tension thereon, the respective ends of such spring being soldered to the collars.

In the modification shown in Figs. 10 and 11, the case is made in two parts D D^1, the sides of the part D being reduced to form opposite flat faces 3 and the tongues 4 extend out from the part D^1 upon the faces 3, and pins 5 pass through these parts to pivot the parts D and D^1 together. The spring 6 serves to draw these parts into alignment. In the modification shown in Fig. 12, this portion of the case is cut in two parts E E^1, and a hinge joint 7 connects said parts together, the latch spring 8 on one part engaging the other part holds them together when in their normal position.

In either of the forms shown, the outer case can be acted upon by one hand and the upper part turned or deflected so as to stand at an angle to the lower portion for liberating the tool from the tool-holder, and when released from the action of the hand the parts are brought axially into line for grasping the tool as hereafter set forth.

Figs. 2, 3, 15 and 16 show separately the sleeves *b* b^1 that screw together, and Fig. 4 a short sleeve *c* that occupies a position adjoining the end of the sleeve b^1 (Figs. 1 and 3) and in line therewith. The sleeve *b* is provided with an enlargement 9 Fig. 2, and the tapering case A has a shoulder 10, Fig. 1, against which the enlargement 9 comes when the sleeve *b* is introduced into the tapering case A. When the case A and collar a^1 are screwed together as shown in Fig. 1, the end of the coupling 2 comes adjacent to the other end of the enlargement 9 so that a bearing is provided in the case A for the sleeves *b* and b^1 to prevent end movement.

A similar construction is shown in Fig. 13, wherein a hard metal collar b^2 is held between the end of the case A and an internal rib on the collar a^1, which collar b^2 forms a stop around the back end of the sleeve b^1, thus holding the sleeves *b* b^1 within the tubular case and preventing end motion but allowing them to be revolved freely.

The forward end of the sleeve *b* is tapering to conform to the interior of the case A and it is also internally tapered to act on the holding jaws *d*, Figs. 1 and 5, or d^1, Figs. 13 and 17, and these jaws form the tool-holder. The back end of the sleeve b^1 is made with an internal rib 11, Figs. 1 and 3.

The holding jaws *d* d^1, Figs. 5 and 17, are made with an open center to receive the tool and slotted longitudinally to allow the jaws to spring, and the forward ends are tapering and received into the tapering sleeve *b* so that a longitudinal movement of the holding jaws either contracts them to grip the tool or permits of their expansion to liberate the tool. The back end of the tool-holder, Fig. 5, is reduced and fits into one end of the sleeve *e*, Fig. 6.

The adjustable stems *f* f^1, Figs. 7 and 18, each have a threaded portion 12 and screw into the tapering split end of the sleeves *e* or e^1, Figs. 6 and 19. These

stems *f* and *f*[1] each have a screw driver notch 13 at one end, and the stem *f*, Figs. 1 and 7, has a head 14 with a cup-shaped recess at the other end.

The rod *h* has a screw threaded end to connect with the dental engine shaft, and in Figs. 1 and 8 its inner end is made with a neck and a head *h*[1] in the end of which is the cup-shaped recess 15.

The split toggle bar *i*, Figs. 1 and 9, is between the head 14 of the stem *f* and the end of the rod *h*, and it has rounded ends entering the cup-shaped recesses in said head 14 and the head *h*[1] of the rod *h*.

A helical spring *k*, Fig. 1, surrounds the rod *h* between the collar *c* and the pin *k*[1] that passes through the rod *h*, and the action of this spring is to force the rod *h* backward causing the head *h*[1] to bear firmly against the internal rib 11 of the sleeve *b*[1] and to keep the parts normally in axial line.

The parts shown in Fig. 1 are put together in the following manner and order:

The rod *h* is dropped into the sleeve *b*[1], the rib 11 arresting the head *h*[1]. The collar *c* and spring *k* are then slipped over the rod *h*, the spring *k* compressed and the pin *k*[1] inserted through the rod, thus connecting these parts. The holding jaws *d* are inserted in the sleeve *e* from the left hand and the adjustable stem *f* from the right hand and the sleeve and stem are screwed together. The sleeve *b* is now passed over the holding jaws *d*, sleeve *e* and stem *f*. The toggle *i* is then inserted in the sleeve *b*[1] and the sleeves *b* and *b*[1] are screwed together at the enlargement 9. These parts are then inserted in the taper case A and the case B is passed over the rod *h*, and the cases A and B are screwed together at the coupling 2, thus holding the internal parts in place at the enlargement 9. A screw driver can be inserted in place of an operating tool and it engages the stem *f* at its notch 13, and by rotating said stem in the sleeve, the parts are adjusted in their axial line to provide for slight variations in the dimensions of the tool shanks so as to bring sufficient pressure by the holding jaws to grip the operating tool C. This adjustment also provides for wear of the parts. The dental engine rotates the rod *h* and the parts within the connected cases A and B that extend from such shaft to the tool-holder.

To release the operating tool from the grip of the holding jaws, it is only necessary to bring one part of the case at an angle to the other part and thereby produce an elongation of the axis of the hand piece. This is accomplished by one hand while holding the hand piece by a pressure of the thumb and fingers bending the helical spring *a* out of line with the tapering case A, and in so doing moving the rod *h* into the dotted position shown in Fig. 1.

This movement rocks the head *h*[1] upon the rib 11 and swings the toggle *i* into the dotted position shown, thus altering the axial line of the toggle and shortening its length between perpendiculars and at the same time relieving the pressure on the stem *f* and holding jaws. The holding jaws *d* expand as their tapering end is drawn back within the inner tapering surface of the sleeve *b*, and a slight longitudinal movement is imparted to the holding jaws *d*, sleeve *e* and stem *f*, and the operating tool is released and can be removed and another inserted. The release of pressure upon the hand piece permits the springs *a* and *k* to act and return the parts to a normal condition of alignment, and by this movement the pressure upon the holding jaws is restored and the operating tool firmly gripped by the tool-holder.

In the modification shown in Figs. 10 and 11, the spring 6 acts to press the parts D D[1] of the hand piece normally in line and when a pressure by the hand brings the part D at an angle to the part D[1], the internal parts act as hereinbefore described to release the tool.

In the modification shown in Fig. 12, the spring 8 is to be unlatched before the part E of the hand piece can be brought at an angle to the part E[1] to operate the internal parts as hereinbefore described. This latch spring 8 maintains the parts normally in alignment.

The object of splitting the toggle *i* is that the end parts thereof may

automatically yield to a slight extent and approach one another in the cup of the head 14 and shorten the axial length of the parts in case it develops after the insertion of the operating tool in the tool holder that there is too much pressure upon the parts as they approach the axial line owing to slight variations in size. Perfect alignment is thus ensured in the normal position of the parts.

In the modification shown in Figs. 13 to 28 inclusive, the spring tool-holder d^1 is tapered at both ends and one end of the sleeve e^1 is recessed to receive one end thereof.

The rod h from the dental engine shaft is connected by a pin 17 with the collar c^1. A screw stem or rod n is provided with a head n^1 and adjacent neck, there being a flaring hole through the head n^1. This head n^1 is received within the collar c^1 behind the internal rib 11 and a pin 16 passes through the flaring hole and connects the head and collar together, and the end of the collar c^1 is provided with rocking faces 19. A head block o that surrounds the rod n is provided with curved rocking faces 18 receiving the faces 19, and the block o fits into and bears against the end of the sleeve b^1.

This rod n screws into the sleeve m and around the rod n between the sleeve m and end of the sleeve b^1 is the expansive spring k whose action is to force the sleeve m forward and so hold the head n^1 against the rib 11. The opposite ends of the sleeves m and e^1 are notched and the opposite ends of the thrust piece r are reduced and received in said notches, one end bearing against the threaded stem f^1, and the other and notched end bearing against and receiving the reduced end of the rod n. In the operation of the parts the clamping nut g prevents the collar a^1 turning upon the sleeve b^1 after the parts have been adjusted.

When the hand piece is bent in the hand, the tubular case l rocks upon the end of the collar a^1 as a fulcrum, the helical spring a is bent and the rod h swung into approximately the position shown in Fig. 28. This operation disturbs the alignment of the internal mechanism and causes the rocking face 19 of the collar c^1 to move up the curved surface 18 of the head block o and so draw the rod n and head n^1 and sleeve m longitudinally, compressing the spring k and releasing the parts r, e^1 and so that the tool-holder is free to expand and release the tool.

When the pressure of the hand is released, the springs return the parts to their normal position of alignment and the tool is again gripped.

Figs. 1, 13 and 14 show the most compact and acceptable form of flexible case, but I do not limit myself to any particular form of flexible case for dental hand-pieces.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is :

First. In a dental hand piece the combination with the spring tool holding jaws and a flexible connection between the same and the dental engine shaft for rotating such jaws, of an enclosing case capable of being bent out of a straight line while held in the hand and mechanism acted upon by the bending of the case for releasing the tool from the spring holding jaws, substantially as set forth.

Second. The combination in a dental hand piece with the rotating shaft, of a tool holder, a jointed connection from the holder to the dental engine shaft, a sleeve within which the tool holder is revolved and a flexible portion connected with the sleeve and adapted to be bent out of a straight line, substantially as specified, whereby an end motion is given that liberates the tool, substantially as set forth.

Third. In a dental hand piece the combination with a flexible case capable of being bent out of a straight line while held in the hand, of a tapering tube, spring tool-holding jaws that slide in said tapering tube, a flexible connection between the

engine shaft and the holding jaws, whereby said holding jaws are actuated by the bending of the flexible case, substantially as set forth.

Fourth. The combination with the holder for the operating tool and a surrounding tube, of a flexible connection from the holder to the dental engine shaft for rotating the tool, a tubular case to receive the aforesaid parts and composed of two separable parts screwed together, the one part being rigid and the other part flexible and capable of being bent as held by the hand to deflect the axial line and effect an elongation that releases the grip of the holder on the tool, substantially as specified.

Fifth. In a dental hand piece, the combination with the holder for the operating tool, means for rotating the same and which means are adapted to be deflected from their axial line, of the rigid case A, the helical spring a and collars a^1 a^2 connected to the ends of the helical spring and forming a flexible case, the collar a^1 screwing into the case A and the collar a^2 connecting with the covering of the engine shaft, substantially as and for the purposes set forth.

Sixth. In a dental hand piece the combination with the tool holder for the operating tool, and the tubular case, of the connecting sleeves b b^1, the stem f, the sleeve e for the said tool-holder and stem, the rod h from the dental engine shaft, the collar c and the spring k upon the rod h and the holding pin k^1 through the rod h, means for holding the rod h in its relation to the sleeve b^1 and a toggle or equivalent device between the stem f and rod h, substantially as and for the purposes set forth.

Seventh. In a dental hand piece, the combination with the tool-holder for the operating tool and the tubular case, of the sleeve b^1 having an internal rib 11, the rod h, and a head h^1 on the same bearing against the rib 11 and having a cup-shaped end recess 15, the stem f having a head 14 with a cup-shaped end recess, the split toggle i with rounded ends resting in the said cup-shaped recesses, substantially as set forth.

Eighth. The combination in the dental hand piece, of a tapering spring tool-holder and its surrounding sleeve, means for moving the tool-holder endwise to clamp the tool and a screw intervening between the parts for adjusting the tool-holder to different tools, such screw having at its end adjacent to the opening in the tool-holder a notch or engaging device for a screw driver introduced through the tool-holder, substantially as specified.

Ninth. In a dental hand piece, the combination with the sleeves, of the tool holding jaws, the internal sleeve e, the threaded adjusting stem f, the rod from the dental engine shaft and a toggle between the adjusting stem f and said rod, substantially as and for the purposes set forth.

Tenth. In a dental hand piece, the combination with the sleeves, of the tool holding jaws, the internal sleeve e, the threaded adjusting stem f, the rod from the dental engine shaft, and a split toggle i between the adjusting stem f and said rod, substantially as and for the purposes set forth.

Eleventh. In a dental hand piece, the combination with the holder for the tool, of the sleeve b, the connecting sleeve b^1 having an internal rib 11, the rod h having a head h^1 bearing against the rib 11, a collar c around the rod h bearing against the end of the sleeve b^1, a pin k^1 or stop upon the rod h and a helical spring k around the rod h between the pin k^1 and collar c acting to keep the head h^1 seated against the rib 11, substantially as specified.

Twelfth. In a dental hand piece the combination with the holder for the tool, of the sleeve b^1 connected therewith, the rod h passing into the sleeve b^1, the collar c and spring k surrounding the rod h and a pin or stop k^1 connected to said shaft, whereby the axial line may be made angular to actuate the tool-holder, substantially as set forth.

Dated this 3rd day of September 1896.

BREWER & SON,
London and Leeds, Agents for the Applicant.

London: Printed for Her Majesty's Stationery Office, by Darling & Son, Ltd.—1896

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 19.

Fig. 15.

Fig. 13.

Fig. 17.

Fig. 18.

Fig. 14.

Fig. 20.

Fig. 16.

Fig. 21.

Fig. 24.

Fig. 25.

Fig. 26.

Fig. 23.

Fig. 22.

Fig. 27.

Fig. 28.

London. Printed by Darling and Son Ld.
for Her Majesty's Stationery Office. 1896.

Malby & Sons, Photo-Litho.